**Table 1. Core capability questions.**

| No. | Likely Question |
|---|---|
| 1. | What does the device detect today? |
| | The detectable substances are currently limited to TNT and Cocaine. |
| 2. | Does it replace detection dogs? |
| | It replaces the nose of detection dogs. |
| 3. | How sensitive is it? |
| | The sensitivity to TNT measured in the lab is 50ppt. This matches the sensitivity of a detection dog. |
| 4. | What does the two-metre detection range actually mean? |
| | The two meters are an estimate based on lab results and mass transfer calculations. The real-life detection range will depend on environmental conditions and will be validated in May-June 2026. |
| 5. | Is the current detection capability based on pure TNT vapour in the laboratory, or on realistic mine/munition samples in soil and field conditions? |
| | The current detection capability is based on pure DNT – a compound contained in every TNT sample and used for detection dog training. However, the used sensor is very selective and should not react with any interfering molecules. |
| 6. | Does the device detect TNT itself, TNT degradation products, or a broader explosive odour signature? |
| | The sensor detects DNT – a compound contained in every TNT sample and used for detection dog training. Experiments with pre-detonated TNT will be conducted in May-June 2026 to verify whether the sensor reacts to degradation products. |

**Table 2. Source localisation and operational interpretation.**

| No. | Likely Question |
|---|---|
| 7. | Can it pinpoint the exact source? |
| | The sensor signal is proportional to the Vapor concentration in the air. Thus, a gradient search leading to the source could be performed. |
| 8. | What happens when it alarms? |
| | The sensor signal is always displayed to the user. Additionally, a buzzer can be activated that generates a sound, as soon as a certain threshold is reached. |
| 9. | What happens when it does not alarm? |
| | Nothing. It is only an additional layer of security. No de-mining operation should solely rely on this one sensor. |
| 10. | What search pattern, movement speed and sampling height would be required to avoid missing a target? |
| | Samling height and movement should be similar to the one of a detection dog. No more than 1 m/s. Has to be validated in field test. |

**Table 3. False positives and false negatives.**

| No. | Likely Question |
|---|---|
| 11. | What are the likely false positives? |
| | Might react to previously detonated TNT. Has to be validated in field test. |
| 12. | What are the likely false negatives? |
| | Might not have enough sensitivity. Has to be validated in field test. |
| 13. | How will the system distinguish between an actual mine and background explosive residue or contaminated rubble? |
| | If a dog cannot distinguish, so neither can this system. |
| 14. | What probability of detection and false alarm rate have been achieved in blind testing? |
| | No field testing yet. Expecting results in May-June 2026. |

**Table 4. Mine types and buried targets.**

| No. | Likely Question |
|---|---|
| 15. | Can it detect plastic mines such as PFM or butterfly mines? |
| | Yes, if they contain TNT. Unfortunately, PFM mines contain VS-6D – a different type of explosive. |

| | |
|---|---|
| 16. | Can it detect buried mines? |
| | Has to be validated in field test. |
| 17. | Which explosive fills can it detect in real mine types, for example TNT, RDX, Composition B, TG-40 or other mixed fills? |
| | For now only TNT. |
| 18. | How does burial depth affect detection, for example surface-laid, shallow-buried, 5 cm, 10 cm or deeper? |
| | Has to be validated in field test. |
| 19. | How does mine age affect detection, including newly laid mines compared with mines that have been in the ground for years? |
| | Has to be validated in field test. |
| 20. | Can it distinguish between a mine, a UXO item, explosive residue, fragments, or contaminated soil? |
| | Has to be validated in field test. |

**Table 5. Portability and deployment options**.

| No. | Likely Question |
|---|---|
| 21. | How portable is it? |
| | Handheld device. |
| 22. | How would it be deployed in the field? |
| | Either attached to multisensory array, on mine plough, or handheld by an operator. |
| 23. | Can a normal deminer use it? |
| | Yes |
| 24. | What is the battery life, warm-up time, calibration requirement and sensor recovery time after an alarm? |
| | Battery life: ca. 2h. Warm up time: ca. 20s. Calibration can be done manually. Recovery time: ca. 2s. |

**Table 6. Comparison with existing technologies**.

| No. | Likely Question |
|---|---|
| 25. | How does it compare with IMS or mass spectrometry? |
| | Works continuously and with vapor but can only detect TNT and cocaine. |
| 26. | Why should we use this system instead of an existing IMS trace detector or portable mass spectrometer? |
| | Continuous detection possible. |
| 27. | Does the system produce a compound-specific identification, or only a change in resistance that suggests possible TNT vapour? |
| | Only change in resistance. For future applications, multiple different metal oxide sensors could be used to differentiate between various compounds. |
| 28. | How does the system manage sensor drift, ageing, humidity effects and baseline instability compared with IMS/MS? |
| | Drift is cancelled out computationally. Baseline can be changed manually. |
| 29. | Is there a plan to benchmark the device against dogs, IMS, MS and controlled laboratory analysis during the same field trials? |
| | Not yet. First field tests will only include the detection of buried TNT. |

**Table 7. Environmental and urban conditions**.

| No. | Likely Question |
|---|---|
| 30. | How does weather affect it? |
| | Has to be validated in field test. We plan to mitigate humidity by heating up the intake airtube. |
| 31. | Can it work in urban rubble or buildings? |
| | Yes. |
| 32. | How does soil type affect detection, for example sand, clay, loam, gravel, asphalt dust or mixed rubble? |
| | Has to be validated in field test. Dust particles are filtered on the intake airtube. |

| | |
|---|---|
| 33. | How does moisture affect detection, including rain, saturated ground, standing water or very dry soil? |
| | Has to be validated in field test. We plan to mitigate humidity by heating up the intake airtube. |
| 34. | Can it operate in areas with heavy background contamination, such as demolition sites, strike locations, ammunition storage areas or former battle positions? |
| | Has to be validated in field test. |
| 35. | How does airflow behave in confined or complex urban spaces, such as basements, culverts, voids, tunnels and collapsed buildings? |
| | Less airflow means higher vapor concentration of explosives. Thus easier detection. |

**Table 8. Accreditation, risk and first use case**.

| No. | Likely Question |
|---|---|
| 36. | How will it be accredited? |
| | Military qualification standards. |
| 37. | What is the biggest risk of the technology? |
| | Low sensitivity. |
| 38. | What is the first realistic operational use case? |
| | Deployment on multi sensor device for demining. |
| 39. | Can a negative result ever be used to support land release, or should the device only be used to generate positive investigation points? |
| | Only for positive investigation points. |
| 40. | What field trial design would convince an HMA operator or national authority that this system is safe and useful? |
| | Mounting sensor on an autonomous device that maps a contaminated area for buried mines. |